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carefully guarded against debasing influences. The public look to the medical profession for the conservation of their health interests, and it is especially our fault if they go wrong or fall short of due measure.

I desire to state here that one of my colleagues on this committee, as well as in the State Board of Health, suggests the utility of sanitary conventions, to be held under the auspices of the State Board of Health. The object is to arouse, in various parts of the State, an interest in public hygiene among all classes of people.

Such conventions have been held in Michigan, Ohio, Pennsylvania, Kansas and other States, and the proceedings, embodied in the reports of their State Boards of Health, indicate good work in the character of the papers read and the discussions upon them, and in the attendance upon the meetings. In my judgment this proposition is worth trial, and I hope and believe that useful results would follow.



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# LEPROSY

## ITS EXTENT AND CONTROL, ORIGIN AND GEOGRAPHICAL DISTRIBUTION.

By H. S. ORME, M. D., Los Angeles.

The origin of leprosy, like the source of other specific maladies, is totally unknown. In its present form it has certainly prevailed for thousands of years—long anterior to the dawn of authentic history. The earliest description of the disease was written by the Hindoo Atreya, who is supposed to have lived 2000 years B. C., but it is so vague and the symptoms so variable that he may have included several different affections under the common term *Kushta*, as he attributed most of the morbid appearance to *wind*. Whatever this may mean, it is evident that both causes and symptoms were then very imperfectly understood. The same vagueness is found in the description of *tsaraath* by Moses in Leviticus, and the fact that both considered certain forms curable indicates that several distinct pathological conditions were included under one term. Moses probably made no distinction between true leprosy and certain macular and scaly eruptions, since the weekly inspection of suspected cases would have no significance in leprosy, and the ceremonial observances of cleansing would be useless in this affection. All this is not strange when we consider that medical writers, until nearly the middle of the present century, made no clear distinction between typhus and typhoid fevers; and that, until the middle of the 18th century, both measles and scarlatina were included under the common term *morbilli*; while the Arabian physicians some centuries earlier classed small-pox in the same category with the other two. We shall see later on that some individuals of our day regard leprosy and syphilis as variations of the same disease.

It is probable that leprosy, as we now understand it, has not been absent from the most ancient seats of civilization, China, India and Egypt, since some undefinable period in the childhood of our race. Whether in these countries it was more or less

prevalent in remote ages than now, can only be conjectured; but its history in Europe during the Christian era is so well known that we are certain of its general ravages from the 12th to the 15th centuries, when it is estimated that there were as many as 1900 lazarettos devoted to the treatment of lepers at one time in the various countries of Europe. These establishments were instituted in France in the 8th century; in Ireland about the middle of the 8th; in Spain, at the beginning of the 11th; in England, during the 11th; in Scotland, and the Netherlands, during the 12th; and in the following century in Norway (1266). There is evidence of civil regulations touching lepers in Lombardy as early as the year 643, and in France in 757. The Church Council at Orleans in 549 imposed the care of lepers on the Gallic bishops, and this was confirmed by one held at Lyons in 583. Dr. Erasmus Wilson avers that it had reached England in the 6th century. It seems strange that leper hospitals should not have been established there for four centuries.

Since the beginning of the 16th century it has declined, and at the present time has mostly disappeared in that part of the world. Its introduction to Europe has been variously attributed to the arrival of the Roman legions from Eastern conquests and the return of the Crusaders in the 11th and 12th centuries. It is more than probable that leprosy had gained a foothold before the Christian era, that the returning Crusaders introduced it afresh and spread it over the land. The world's medical history during the intervening ages is exceedingly scanty and vague.

At the present time it lingers in some parts of Europe far separated from each other and nowhere in threatening proportions. In Spain, in the lazaretto, at Granada, there were 53 cases in 1860. Within the present decade there has been a much smaller number in a lazaretto at Barcelona. There are no legal restrictions on lepers in Spain, but it is probable that social ostracism here, as in most parts of the world, drives them as outcasts into seclusion, and it is also probable that many small groups of lepers remain undiscovered or unmentioned in various obscure communities.\*

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\*Sir Morell Mackenzie, in a recent article on "The Dreadful Revival of Leprosy," sounds a loud warning note, and declares that unless prompt measures are taken, we have every prospect of seeing a great spread of this full disease through the countries which are to-day comparatively free. The contagiousness of leprosy he considers beyond question.—*Ind. Med. Jour*

The history of leprosy in the Sandwich Islands is of surpassing interest, owing to its dreadful ravages and the recent date of its recognized appearance. Its introduction has generally been charged to Chinese immigrants or coolies, and this notion is connected with the vernacular term, "mai pake," Chinese sickness.

The common agreement is that leprosy had not made much headway previous to 1860. Dr. Hillebrand avers that it was brought by the Chinese in 1848. Dr. Saxe states: "Leprosy was unknown to the natives until 1848, when it was introduced by the Chinese, and Ahai, a Chinaman was the first leper recognized by the Hawaiian Board of Health."

Dr. Emerson, President of the Board of Health of the Hawaiian Kingdom, says in his report for 1888: "Leprosy was first clearly made out to exist in this country about the year 1840 in the person of one Naea, a messenger of the chiefs, who died in 1852. The friends of Naea thought he had the disease for about ten years before his death. His case was reported by the Rev. D. D. Baldwin, M. D., of Lahaina, in a communication to the Minister of the Interior, Hon. Chas. G. Hopkins, dated May 26th, 1864. In 1863, Dr. Baldwin obtained by reports from the deacons of his Church at Lahaina, the names of sixty people who were supposed to be affected with the disease."

Since the discovery of the Sandwich Islands in 1778, they have often been visited by ships manned by sailors from regions of the world where leprosy constantly prevails, and leprous sailors might have planted the disease by cohabitation with the native women. Besides, large numbers of Hawaiian seamen have sailed to all the shores of the Pacific and Indian Oceans, and they could easily have contracted it by intercourse with lepers abroad, and afterwards have communicated it to their countrymen at home.

One indication that leprosy is not an ancient occupant of these islands, is the fact that the majority of the cases are of the tubercular form, and formerly the preponderance was still more marked; while in India and China, where it has existed many centuries, the anæsthetic type is the prevailing one.

In 1886, of 652 cases at the Molokai settlement, 333 were classed as tubercular, 204 as anæsthetic and 115 as mixed. Leper population March 31, 1888, at Molokai, males 495, females 254, total 749.



By 1864, leprosy had increased among the natives to such an extent that the authorities and people of intelligence became alarmed, and in 1865 a law was enacted providing for the isolation of all lepers. There has always been great difficulty in its execution, not from open resistance, but from the hiding and secretion of lepers. Several characteristics, on the amiable side of human nature, obtain to excess among these simple people, which promotes in the highest degree the spread of contagious diseases.

Christianity and civilization have failed to eradicate the indiscriminate sexual relations which have always existed, and intercourse with foreign ships' crews since 1779, the date of Capt. Cook's arrival, has saturated the population with venereal diseases, so that a great many of the people of both sexes are believed to be subjects of syphilis, either inherited or acquired. Again, these people are the most friendly and sociable creatures in the world, both with strangers and each other. Persons suffering with the most loathsome diseases are not to them objects of abhorrence, but rather of benevolent attention. In their homes and in their social relations they observe the closest habits of affectionate intercourse, eating from the fingers from a common dish, passing the pipe from one mouth to another, and sleeping together indiscriminately in their small, close habitations. The race distribution of leprosy in these islands is striking. Nearly 90 per cent of the known cases have been among the native race. Though the Chinese are accused of introducing the disease, they have contributed very few to the leper population; and the President of the Board of Health in 1886 asserted that he had not known of an imported Chinese leper since the enactment of the anti-leprosy law.

The unexampled spread of leprosy in these islands after 1870 may be attributed to several causes. There can be no doubt that the lowering of the vital stamina of the race by the great prevalence of syphilis, prepared them for the inroads of any disease that might threaten. During this period small-pox also scourged the people, and in 1868 there began a general vaccination in which virus was taken indiscriminately from human subjects. This reckless practice doubtless contributed greatly to the spread of both syphilis and leprosy.

TABLE OF LEPERS AT THE MOLOKAI SETTLEMENT, HAWAIIAN ISLANDS—  
1866—1886.

YEAR.	LEPERS REC'D.			PRESENT JAN. 1.	DIED.	DISCHARGED.	ALIVE IN 1886.	NATIONALITIES.			
	M.	F.	TOTAL.					HA- WAI.	WHITE	CHI- NESE.	OTH- ERS.
1866....	103	38	141	.....	26	10	.....	139	.....	2	.....
1867....	57	13	70	105	25	7	.....	68	1	.....	1
1868....	76	39	115	143	28	2	.....	113	1	1	.....
1869....	73	53	126	228	59	11	.....	126	.....	.....	.....
1870....	31	26	57	284	58	4	6	57	.....	.....	.....
1871....	128	55	183	279	51	9	5	183	.....	.....	.....
1872....	69	36	105	402	64	4	8	105	.....	.....	.....
1873....	295	192	487	439	156	21	14	483	.....	3	1
1874....	53	38	91	749	161	8	8	90	1	.....	.....
1875....	128	84	212	671	163	14	16	207	3	1	1
1876....	57	39	96	706	122	3	5	95	1	.....	.....
1877....	110	53	163	677	129	1	13	162	.....	1	.....
1878....	136	103	239	710	147	.....	27	238	1	.....	.....
1879....	82	43	125	802	209	1	37	123	1	1	.....
1880....	34	17	51	717	152	10	41	50	1	.....	.....
1881....	156	76	232	606	132	.....	51	229	2	1	.....
1882....	53	18	71	706	121	13	60	68	1	2	.....
1883....	185	116	301	643	150	10	149	300	.....	1	.....
1884....	71	37	108	784	168	7	93	99	2	6	1
1885....	75	28	103	717	142	25	96	99	1	3	.....
1886....	16	7	23	653	20	.....	23	.....	.....	.....	.....

Of the above there were:

Full blooded Hawaiians.....	2,997
Mixed Hawaiians.....	37
Chinese.....	22
Whites.....	16
Other Nationalities.....	4
Male Hawaiians.....	1,903
Female Hawaiians.....	1,094

Dr. N. B. Emerson, President of the Board of Health, reported the inmates at the Molokai settlement present January 15, 1889, as follows:

Males over 10 years of age.....	651
Males under 10 years of age.....	15
Females over 10 years of age.....	360
Females under 10 years of age.....	10

Total .....1,036

Of the above there are eight Chinese and eight or ten whites (American, English, German, French, etc.). The number of lepers still at large is small and rapidly diminishing. March 31, 1888, they were estimated to be altogether 644.

There is no apparent reason to suppose that leprosy existed in any part of the New World prior to its discovery by Columbus. At that date it prevailed throughout Europe, and followed the tide of immigration. Whether it was introduced independently from Africa is conjectural, but it has certainly been found more among people of the African race than among all others in America. Their habits of life have always favored the propagation of spreading diseases, and leprosy has ever found its victims chiefly among people and individuals who live in closest social relations. With the advance of civilization, the enlargement of habitations, abundance of clean garments and beds, and the use of separate table utensils, the disease has declined and nearly disappeared from the civilized world.

In British Guiana leprosy is supposed to have come with African slaves. Negro lepers were isolated, and the disease was confined to them. In 1831, they numbered 431, and were then sent to a special establishment on the river Pomeroon. Near by were several Indian tribes, all of which withdrew except the Warrows, who associated with the lepers. In 1842, a census was taken of the Indians, and many lepers were found, but all were Warrows. In 1838 came emancipation, followed by the dispersion of the negroes and the introduction of coolies from India and China, some of whom were probably lepers. Now 2 in 1,000 of the population are lepers, including whites, negroes, Indians, coolies and the mixed races. (*Pacif. M. and S. Jour.*, Jan., 1887.) There is good reason to believe that leprosy appeared in the West India Islands not long after their settlement by Europeans. Dr. Hans Sloan, who was in Jamaica in 1687, mentions a case and describes native plants used in the treatment of the disease. (Prof. Jones in *N. O. Med. & Surg. Jour.*, March, 1878.)

In Jamaica at present there are said to be 700 or 800 lepers, negroes and mulattoes. In Barbadoes it is thought that the increase of lepers is four times as rapid as that of the population. On the Island of Trinidad, according to Dr. W. H. Park, there were three lepers in 1805; and in 1878 about 860. In the British West Indies, as in most of the other British Colonies, there is no isolation of lepers.

It is quite probable that leprosy exists on most, if not all, the other West India Islands, but its extent is unknown.

In the American Colonies of the Netherlands lepers are

strictly segregated in Government asylums. The one in Surinam has 102 inmates, of whom, in 1883, 37 were Europeans, 56 natives and 9 immigrants from British India. In 1884, the asylum in Curacon contained 13 inmates; that in St. Martin 10; and that in St. Eustatius 19. Their isolation results from general belief in these colonies of the contagiousness of leprosy, which belief is not entertained in East Indian Colonies.

I have no precise information upon leprosy in other South American States, except a denial of its existence in Chili to the inquiry of the Hawaiian Government. It is said to exist in Brazil, and probably is absent from few, if any, of those countries.

Dr. Miguel Valladores, Physician to the lazaretto of Guatemala, reports to the Hawaiian Government that leprosy is almost unknown among the aboriginal Indians of pure race. His patients have all been of mixed Spanish and Indian blood. He states that lepers are strictly segregated, and that he had under his care 9 men and 6 women. Isolation has only lately been put in force. Previously leprosy was on the increase. The Hawaiian Consul remarks: "Well-to-do families contrive to secrete an afflicted member of the family in some remote place; this is to my personal knowledge." I have no doubt that the practice of secreting lepers is general throughout the world, wherever the disease prevails, and it is not difficult in an early stage, for lepers to evade the authorities and go about their usual business. I have no particulars from other Central American States, but am disposed to believe that occasional cases of this disease might readily be found among the lowest class of people.

Dr. Gomez, Director of the Lazar Department, Juarez Hospital, Mexico, reports that leprosy, called "Mal de San Lazaro," exists principally in the western regions of the Republic. During his 13 years' service he has had no negroes under his charge, but observes no other race preferences.

The disease has been known in Mexico since the conquest, and Cortez founded a lazaret. At the present time lepers in the city of Mexico are admitted to separate wards in a civil hospital for each sex. The average number of patients is 30. The Superior Council of Health reported in 1886, that leprosy in Mexico existed prior to the conquest. There have been no special leper hospitals for more than 20 years, but the lepers are received in civil hospitals throughout the country. In early times seg-

regation in special hospitals was practiced. It is the belief of the Council that leprosy has decreased in Mexico in the last 75 years, but the fact is not accounted for. As to its ancient prevalence may not early observance have confounded true leprosy with elephantiasis Arabum, or Barbadoes leg?

Sporadic cases of leprosy have been recognized in British Columbia within a few years. The most notable focus of the malady at present on this continent is at Tracadie, N. B., in that portion bordering on the Bay of Chaleurs and river of St. Lawrence. Its origin is not precisely known. Dr. W. H. Park states that it began with a woman named Ursale Landry in 1819. Prof. J. C. White (*Am. J. Med. Sci.*, Oct., 1882) refers its source in 1815, to a woman named Benoit, whose mother came from Normandy. As no preventive measures were used, it gradually spread among different families, but mostly among the descendants of the first case. The first leper hospital was established in 1844, and 32 cases were received within five years. The hospital at Tracadie was founded in 1849, and between this date and 1882 more than 100 patients were received. None are admitted during the first year of the affliction, and very few before the third year. Belief in its contagiousness is general among the people, and plainly recognized lepers are impelled by social ostracism to go into retirement. Nearly all the cases have been of French descent. So far no Indian has fallen a victim.

The following table exhibits the vital movement for the period 1875-85:

TABLE OF LEPERS IN THE PROVINCE OF NEW BRUNSWICK.  
1875-1885.

YEAR.	IN LAZARET.		OUTSIDE.		TOTAL.		NEW CASES.		DIED.		TOTAL.
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	
1875.....	13	7	6	10	20	16	1	1	2	...	36
1876.....	10	5	7	12	17	17	1	2	3	2	34
1877.....	6	8	7	9	13	17	2	1	6	1	30
1878.....	9	8	5	7	14	15	2	2	1	3	29
1879.....	8	7	4	8	12	15	1	2	3	2	27
1880.....	6	9	5	8	11	17	1	2	2	...	28
1881.....	8	13	5	3	13	16	2	.....	...	1	29
1882.....	11	14	4	1	15	15	2	.....	...	1	30
1883.....	10	12	4	1	14	13	.....	.....	1	2	27
1884.....	10	11	3	1	13	12	.....	.....	1	1	25
1885.....	11	10	2	1	13	11	.....	.....	...	1	24

Dr. A. C. Smith, physician in charge in December, 1889, reported 20 inmates, 9 males and 11 females. Two were admitted



during the year, in which time there were no deaths. In September, 1889, he reported about 18 lepers in Tracadie. It thus appears that the disease has steadily diminished since the plan of isolation was established, the apparent increase being accountable by discovery of cases previously concealed or not recognized. As will be seen hereafter, there have been some desertions.

Prof. White gives a group of 11 cases of leprosy, which were traced out in the Island of Cape Breton, six of whom consisted of a woman and her five children. There was also a son-in-law and two children, and another son-in-law whose wife was not a leper, but he used to sleep with one of his leper brothers-in-law. The other case waited on one of the sons and washed and laid him out after death.

The first case became affected in 1852 and the last in 1870. All were dead before 1882, except the last, and he was far advanced. It is worthy of notice that the mother of these children and first of the group was born on Prince Edward's Island in 1836, which island is not far from the New Brunswick seat of leprosy.

Somewhat more than 25 years ago the discovery was made of the existence of leprosy among immigrants from Norway in several of the new Northwestern States of the Union. From that time to the present scattering cases have occurred, but the disease shows no tendency to spread. It is easy to trace direct connection between them and the leprous population of Western Norway.

In 1863 Dr. Holmboe, of Norway, visited his countrymen in those States and found 12 lepers among them, most of them diseased before emigrating. In no case had a native child of this country developed the disease, and it was observed to pursue a milder and more prolonged course in this country than in Norway. (Prof. J. C. White in *Am. J. M. Sci.*, Oct., 1882.) It has been asserted that Norwegian lepers have been advised at home to emigrate to this country, for the benefit of their health.

In 1869-70 Prof. Wm. Boeck, Christiania, visited the N. W. States, and found 18 cases in Wisconsin, Iowa and Minnesota, all from Western Norway. Of these 9 were of the anæsthetic type, 3 tubercular, and 6 mixed. Four of them knew of no leprous relatives. (*Report Minn. Board of Health*, 1884.) Up to 1879 26 cases had been reported in Wisconsin, Iowa, Minnesota and Nebraska among Norwegian and Swedish immigrants.

A child of a leprous father born in this country, was reported by Dr. Hyde in 1879, the only native leper of this group. (Dr. J. L. Babcock, *N. Y. Med. Rec.*, Sept. 15, 1888.) In 1886, Dr. K. Hoegh, member of the Wisconsin State Board of Health, as the result of his investigation, stated his opinion that at least 160 Norwegian lepers (probably more) had come to this country since 1858. Norwegian records contain the names of 68. Many developed the disease after arrival, and some doubtless escaped notice. In 1886 he knew of three cases in that State.

The State Board of Health of Minnesota in Oct., 1889, reported to me 7 cases known in the State. Only one was isolated. All the others were able to attend to their usual business. All were Norwegians and males, 35 to 73 years old, and affected with leprosy from 11 to 29 years. Five of them had developed before emigration to this country. Two of them have healthy children. The others have no living children. Between 1868 and 1889 there had been 19 deaths. Dr. G. A. Hansen, Surgeon of the Bergen (Norway) Leper Hospital, in a recent visit to the Northwestern States, estimates that there were only 16 or 17 lepers then alive. (*Occi. Med. T.*, August, 1889.)

In a book entitled "Concise Natural History of East and West Florida," published at New York in 1775 and quoted by Prof. Joseph Jones, of New Orleans, is found a description of a disease then prevailing among the negroes which was probably leprosy. The evidence that the malady then prevailed in the Spanish Province of Louisiana is stronger. Gayarré, in his history of Louisiana, volume 3, page 167, says: "One of the first measures of Miro's administration was one of charity. It is remarkable that leprosy, which is now so rare a disease, was then not an uncommon affliction in Louisiana. Those who were attacked with this loathsome infirmity generally congregated about New Orleans, where they obtained more abundant alms than in any other parts of the Colony. They naturally were objects of disgust and fear, and the unrestrained intercourse which they were permitted to have with the rest of the population was calculated to propagate the distemper. Ullon (whose administration began in 1766) had attempted to stop this evil by confining some of the lepers at the Belize (mouth of the Mississippi river), but this measure has created great discomfort and has been abandoned. Miro now determined to act with more efficacy in this matter, and on his recommendation

the cabildo, or council, caused a hospital to be erected for the reception of these unfortunate beings in the rear of the city. In the course of a few years the number of these patients gradually diminished either by death or transportation, the disease disappeared almost entirely, and the hospital went into decay."

From this time leprosy appears to have attracted no public attention in Louisiana until about 1879, when the State Medical Society undertook its investigation. At that date Dr. Salomon had discovered six cases in New Orleans, and six more were reported in Vermillion Parish, near the Gulf of Mexico. This last group originated with a woman born in Louisiana, whose father came from the South of France. It does not appear that he was a leper, nor is there evidence of leprosy in the previous history of the family. The woman developed the malady in 1866 and died in 1870. In 1880, Prof. Joseph Jones, then President of the State Board of Health of Louisiana, visited the parish of La Fourche and there found another group of twelve cases. There was strong evidence that the disease had existed for several generations. These cases in the two country parishes (counties) were all French Creoles and of the humblest class of white people. It therefore appears that at least eighteen lepers were found in Louisiana in 1880, with a strong probability that a considerable additional number remained undiscovered. A report from the Louisiana Board of Health in May, 1889, gave twelve cases in the before mentioned parish of La Fourche, three positive and three doubtful cases at St. Martinsville, and forty-two known cases at New Orleans. It is remarked: "The cases in St. Martinsville are all descendants of one man, who died some years ago of leprosy, he having inherited the disease after it had skipped one generation."

The compiler of the accompanying table of cases in New Orleans, being the clinical lecturer on Dermatology at the Medical College and Polyclinic, and Dermatologist to two hospitals, has unusual opportunities for observation, of which he has fully availed himself. It is probable that hardly a case in that city has escaped his notice, and that the majority in the State have come under his eye. It is to be noted that only ten had relatives similarly affected, and Dr. Blanc remarks: "Some of the patients have had perfectly healthy children after the disease began, but the rule seems to be in females for pregnancy to end in miscarriage, or in a weak, delicate child." To this it might be added that lepers generally lose the procreative func-

tion. It remains to say that there are no legal restrictions over lepers in Louisiana, and that they are received into the New Orleans Charity Hospital, and placed in the ordinary surgical wards with other patients. This practice, however, has not the approval of medical men, but is adopted for want of other provision.

TABLE OF LEPERS IN NEW ORLEANS, 1889—DR. H. W. BLANC.

CASE.	AGE.	NATIVITY.	COLOR.	SEX.	VARIETY	NATIVITY OF PARENTS.	DURATION.	RELATIVES WITH LEPROSY.
1	60	Germany	w	f	Anæs.	Germany	1 year	
2	16	New Orleans	w	m	Tub.		2 years	
3	35	Germany	w	f	M. A.	Germany	5 years	
4	29	New Orleans	w	m	T.		3 years	
5	25	Missouri	w	f	T.		7 years	
6	26	New Orleans	w	f	M. T.	Ireland	7 years	
7	26	Louisiana	bl	f	T.	f'thr Italy, mr La	3 years	
8	75	Louisiana	w	f	M. T.		2 years	
9	48	Germany	w	m	M. A.	Germany	5 months	
10	35	Germany	w	m	T. An.	Germany	10 years	step mother & half brothers
11	47	Louisiana	w	f	T.		6 years	
12	46	Austria	w	m	M. A.	Austria	10 years	
13	27	New Orleans	w	m	T. A.	Ireland	14 years	
14	35	New Orleans	w	m	M.		18 m'ths	
15	65	Ireland	w	m	M. A.	father Ireland		
16	10	New Orleans	w	m	T.	Germany	5 years	
17	63	Germany	w	m	A.	Germany	18 m'ths	
18	27	New Orleans	w	m	T.			mother
19	57	Germany	w	f	T. A.	Germany	8 years	
20	27	New Orleans	w	m	M. A.	Ireland	18 m'ths	
21	24	New Orleans	w	m	A.		3 years	uncertain
22	16	New Orleans	w	m	T. A.	fr Ger. mr Ireland		
23	45	New Orleans	w	f	T.		6 years	two daughters
24	17	New Orleans	w	f	T.	Mississippi, N. O.	4 years	m'thr & sister
25	15	New Orleans	w	f	T.	Mississippi, N. O.		m'thr & sister
26	11	Louisiana	w	m	T.		5 years	
27	14	New Orleans	w	f	M.		4 years	
28	16	Louisiana	w	m	T.	Louisiana	10 years	father & sev'rl relatives
29	15	New Orleans	w	m	T.		5 years	brother
30	13	New Orleans	w	m	T.		2 years	brother
31	51	England	w	m	T.	England	5 weeks	
32	28	Louisiana	bl	m	A.		8 years	
33	54	Germany	w	m	T.	Germany	7 years	
34	18	New Orleans	w	f	T.	f German m N. O.	4 years	
35	21	Louisiana	bl	m	T.	Louisiana	1 year	mother suspi- cious
36	21	New Orleans	w	m	T.	Ireland	1 year	
37	17	New Orleans	w	m	T.	Germany	1 year	
38	36	New Orleans	w	f	M.	f France, m Cuba	4 months	
39	30	Italy	w	m	A.			
40	45	New Orleans	bl	f	A.			
41	48	France	w	f	A.			sister
42	19	New Orleans	bl	m	A.			

Prof. Joseph Jones, of New Orleans, mentions a case of leprosy that he saw less than forty years ago among negroes on the coast of Georgia, who had been brought from Africa. The disease has probably disappeared, as there are no recent accounts of it.

Prof. J. C. White (*Am. J. M. Sci.*, Oct., '82) gives a table of 16 cases, compiled by Dr. J. F. M. Geddings, of Charleston, S. C., in 1876. None occurred to his knowledge subsequently to 1876, and at that date all were known to be dead except two, whose fate was not ascertained. Of these, 11 were whites, 4 mulattoes and 1 black, 5 were Jews, 1 Irish. Fifteen appear to have been Native Americans, and the remaining negro may have been. All occurred between 1846 and 1876. Dr. Geddings remarks: "I can form no opinion as to when the disease first made its appearance in South Carolina. The first case could not in any way be connected with the old cases of the past century in the Gulf States. Both of the first cases were Jews from families coming to this country early in this century. Nor could any of the cases have had any connection with the recently reported occurrence in Louisiana, or from African descent through slaves." With regard to connection between these cases he remarks: "The mulatto named Lazarus is said to be the son of a Jew; the others are of uncertain descent. With the exception of this case there was no special association." It is greatly to be regretted that the origin of these cases was not discovered. Dr. T. G. Simmons, of Charleston, a member of the State Board of Health, informed me, in September, 1888, that there had recently been a death from leprosy in that city, and that he knew of four other cases there. Dr. W. H. Geddings, now of Aiken, S. C., but formerly of Charleston, informs me that he had a case under his care in 1884. It is not stated whether these recent cases have any connection with the above mentioned list of 16 lepers.

In the *N. Y. Med. Jour.* for January 5, 1889, the surprising announcement is made by Dr. Berger of 100 cases at Key West. It seems incredible that so large a number could be found in so small a population. If true, it must have existed many years, and then it would be strange for such a spectacle to have attracted no attention.

Dr. Joseph Y. Porter, M. D., Secretary and Health Officer, Florida State Board of Health, in reply to my letter of March



19, 1890, regarding the above, states as follows: "Noting your inquiries I would say that some years ago, possibly two or three, there were, to my knowledge, six cases of leprosy in Key West. At that time the State had no board of health, and my attention was directed to the existence of this disease by being President of the Board of Health of the county in which Key West is situated. These unfortunate people were cared for by their friends and were isolated from the rest of human kind, therefore I did not think—nor do I now—that any danger threatens from these cases.

"It is well known that leprosy exists to quite a degree in Havana, and for that reason, some years before, the State Board of Florida was formed. The Board of Health of Monroe county of this State requires that passengers from Havana, besides being acclimated to yellow fever, should also present a certificate of exemption from leprosy, which certificate was to be signed by Dr. Burgess, who is Sanitary Inspector of Marine Hospital Service attached to the U. S. Consulate at Havana.

"You will appreciate, Doctor, that our Board of Health is still in its infancy, and as yet has not had sufficient time to thoroughly take up this point, but will do so in, I might say, the immediate future; it certainly is a subject that should not be overlooked."

Dr. Geo. H. Fox (*Pop. Sci. Mo.*, Apr., '84) asserts that, during the last ten or fifteen years, cases of leprosy have constantly been present in the New York Hospitals. Dr. R. W. Taylor (*N. Y. Med. Jour.*, July 13, 1889) remarks that during the past fifteen years, he has seen almost constantly one to three lepers in the crowded wards of the hospitals on Blackwell's Island, N. Y.

Dr. Wm. M. Smith, Health Officer, New York, through Dr. Cyrus Edson, Chief Inspector San. Bureau, New York, in reply to a letter of March 16, says: "Careful investigation shows only six cases of leprosy in this city at present. Three are in public institutions, and three are isolated in their residences. During the past ten years we have averaged about six cases present among us at all times."

Dr. Prince A. Morrow states that leprosy has gained a foothold at Salt Lake City through Mormon converts from the Hawaiian Islands. (*N. Y. Med. Jour.*, July, '89.) In confirmation, I am informed by Dr. J. M. Benedict, of that city, that he

has had under his care two Kanaka girls for leprosy. Both are now dead.

I learn that 16 Chinese lepers have been shipped back home from Oregon within a few years. As to the States, etc., not heretofore mentioned, there is said to be a case of leprosy in Canada, also one in Arkansas; one has been reported in Miss., and two or three in Texas. Of deaths within a few years, there have been 8 in Iowa, 9 in La., 2 in Mass., and 19 in Minn.

In California the earliest cases were Chinamen, and up to the present time the great majority have been Chinese. Owing to their migratory habits, it has been impossible to enumerate the lepers correctly. The same individuals might be observed in several different counties, if not promptly apprehended. When sufficiently advanced in the disease to be recognized they have mostly drifted to San Francisco, and found their way to the Twenty-sixth Street Hospital, the pest house.

The majority have been sent back to China, as they have this option. Through correspondents in most of the counties, I have been able to learn of twenty (20) cases under their observation during perhaps as many years, outside of San Francisco, but some of them might also be reckoned there, after arrival from the country. Six deaths are known to have occurred outside the metropolis, but it is probable that other lepers have died of intercurrent diseases, and so have not been included. The law requires all cases to be reported by the local authorities to the Secretary of State who is to keep a complete register of them; but no penalty is provided for neglect, and the duty has not been performed.

Most of the white lepers trace their malady to the Hawaiian Islands. I have been informed by Dr. L. L. Dorr, who was Coroner of San Francisco from 1876 to 1881, that two white lepers came under his official notice as suicides. Both had lived on the Hawaiian Islands. He adds that it has been customary there to allow white lepers to leave the country, instead of going to the Molokai settlement. There are now three white boys, brothers, at the Twenty-sixth Street Hospital who contracted leprosy on the Islands. Their father lives in the city and remains in good health.

I am specially indebted to Dr. W. F. Finnie, Resident Physician of the San Francisco City and County Hospital, for the following particulars, which he has compiled with great pains

from the records of the Twenty-sixth Street Hospital (Pest House).

Total number of lepers admitted from July 5, 1871, to April 1, 1890, 128.

Year	Admitted	Year	Admitted	Year	Admitted	Year	Admitted
1871.....	1	1876.....	3	1882.....	12	1887.....	3
1872.....	1	1878.....	13	1883.....	11	1888.....	3
1873.....	1	1879.....	14	1884.....	9	1889.....	12
1874.....	6	1880.....	10	1885.....	7	1890.....	5
1875.....	9	1881.....	2	1886.....	6		

Nativity.	Number.
China.....	114
Honolulu.....	1
United States.....	3
England.....	1
Sweden.....	1
France.....	1
Japan.....	1
Germany.....	1
Mexico.....	1

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Total..... 128

Last residence other than San Francisco:

San Quentin.....	1
Monterey.....	1
Honolulu.....	5
Merced.....	1
Sacramento.....	3
New York.....	3
Los Angeles.....	2
Petaluma.....	1
St. Louis, Mo.....	1
Napa City.....	1
Dutch Flat, Placer County.....	1

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Total..... 20

Whites.....	12
Mongolians.....	115
Mixed.....	1

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Total..... 128

Males.....	120
Females.....	8

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Total..... 128

Discharged .....	6
Escaped .....	3
Died .....	22
Shipped to China .....	83
Not Noted .....	1
Remaining April 1, 1890 .....	13
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Total .....	128

Of those deceased, three were suicides, one died of accidental suffocation, and one of small-pox.

It is curious that the records of the City and County Hospital give, from 1871 to 1876 inclusive, fifty-seven cases of syphilis, with sixteen deaths; while from 1882 to 1890 there were forty cases and no deaths. Dr. Finnie reasonably presumes that all, or nearly all, of the sixteen fatal cases were leprosy.

#### CASUAL OR SPORADIC.

These occasionally turn up most unexpectedly in places where leprosy has always been unknown or rarely observed. They are a puzzle to medical men and a wonder to the laity. It is probable that they often pass without recognition, for the great majority of physicians are strangers to the disease and would mistake it for something else. The ordinary sources of medical information furnish the following. In England most of them have previously resided in India or the Colonies where leprosy prevails. In 1873 Dr. F. E. Anstie presented a case to the Clinical Society of London, a man 29 years old, who had resided 11 years in India. Three others had previously come under his notice. The same year Dr. Tilbury Fox reported a girl ten years old, who was believed to have contracted leprosy from her wet nurse. The first symptoms appeared when she was between 2 and 3 years of age. In 1853 a tailor, native of Ireland, died of leprosy at Guy's Hospital, London, after an illness of eight years. He was never out of the British Isles. (*Med. Chir. Trans.*, 1860.) In 1872 an Irish leper was shown to the Dublin Medical Society, who had contracted the disease in India. For a year and a half this man's brother, who had only left Ireland for a visit to England forty-six years before, slept in the same bed and wore his clothing. He became a leper and was presented to the same Society. There were no other lepers in the family. (Report Dr. Lee in *Nat. Conf. S. B. of H.*, 1888.)

Cases occasionally present themselves at hospitals in Boston, Philadelphia, Baltimore and other cities. They are mostly sailors, or persons who have lived abroad. A case of leprosy developed in the almshouse of Salem, Mass., in the person of a man named Chas. Derby, lately from San Francisco. He had lived some years at Honolulu, as chief botanist to Queen Emma. (*Med. News*, Dec. 23, 1882.) In 1889 Dr. P. S. Abraham presented two cases to the Epidemiological Society of London, one tubercular, the other anæsthetic. The latter was a native of London, 64 years old, who had been a sailor in the Mediterranean and Baltic, but for the last forty years had not been out of London. He was a meat salesman. Dr. A. thought the period of incubation must have been nearly forty years. He also alluded to a recent case brought to notice at Dublin.

In 1889 Dr. Geo. Dock reported to the Texas State Medical Society two cases of leprosy, of tubercular type, one of 8, the other of 5 years standing; one a native of Germany, the other of Alsace; one a harness and mattress-maker, the other employed in a cotton press. Both had resided at Galveston more than 20 years, and Dr. D. was unable to trace the cause either through heredity or contagion. Prof. White, of Boston, states that one of the Tracadie cases escaped about 1857, and was for a considerable time at Boston under an assumed name. There he was under the doctor's charge for months at the Massachusetts General Hospital. A leper from Louisiana, under a feigned name, lived near Boston and came under his care in 1882. He adds that another Tracadie case has been known at Boston, and one in 1882 was discovered at Providence and returned to Tracadie.

In 1888 a leper, in company with another Chinaman, boarded a train at Ogden. His case was recognized by a physician, who happened to be aboard, and the division Superintendent of the C. P. R. R. was notified; but he refused to have the leper removed from the train, and he was brought to San Francisco. The State Board of Health of Missouri in 1888 reported the discovery of a case in June, 1888. He had lived at New Orleans most of the time from 1866 to 1879, and leprosy developed in 1881. He was removed to the quarantine hospital at St. Louis. In Sept., 1888, two Chinese lepers traveled from Los Angeles to San Francisco, having been sent by their countrymen without knowledge of the authorities. On arrival at San Francisco they



were recognized as lepers and sent to the Twenty-sixth Street Hospital. Late in 1889 two Chinese lepers traveled by rail from New York to San Francisco. One came with a certificate to the Health Officer at San Francisco, that he was affected with leprosy, and a request that "good care be taken of him."

*The Occidental Med. Times* of July 1, 1889, gives the case of a leper committed to the Sacramento County Jail, in an advanced stage of leprosy. He was pardoned by the Governor, so that he might be sent to the Twenty-sixth Street Hospital at San Francisco. Dr. David Powell, of Marysville, Yuba County, California, kindly reports to me the case of a mulatto barber of that place, aged 60, who committed suicide in 1888, on discovering himself to be a leper. He was a native of Virginia, and had not been away from Marysville for 25 years. Symptoms of leprosy appeared in 1884, but he continued to work at his trade long after. Dr. C. E. Stone, President of the local Board of Health, surmises that he might have contracted the disease from Chinese women. Dr. F. B. Sutliff, of Sacramento, informed me about a year ago, that three cases of leprosy had come under his personal observation, in his own community, all of the tubercular type and all at large. Dr. J. L. Babcock (*N. Y. Med. Rec.*, Sept., 1888) states that three cases occurred at St. Louis in 1888. In May, 1888, I myself saw a young man on the streets of Los Angeles, who presented the appearance of a leper, but there was no opportunity for thorough examination. The writer of an article in the editorial page of the *Pac. Med. and Surg. Jour.* for August, 1888, states that he saw a Chinaman on the street in the Chinese quarter of San Francisco a few months previously, who was obviously a leper, but not in a very advanced stage. In the month of February, 1890, no less than three lepers, all white men, have been apprehended at San Francisco and sent to the Twenty-sixth Street Hospital. One, a teamster, forty-one years old, has been affected seven years, and has been twice at the hospital before, but escaped. Another, now twenty-one years old, lived for some years at Honolulu, and has been affected several years. The third, a native of Guatemala, fourteen years old, and one year resident of San Francisco, employed as a dishwasher at various restaurants. He has been a leper for three years.

## CAUSES DETERMINING LEPROSY.

Twenty years ago writers on this subject were much inclined to ascribe the disease to endemic causes, such as proximity to the sea coast, low altitudes above sea level, high temperature, excess of moisture in the atmosphere, etc. It is found, however, that the malady prevails where all these conditions are absent. A fish diet has been accused by many writers of being the cause, but the Hindoos of the interior rarely eat fish. In India it has been attributed to deficiency of salt in food, because the poorest people at the same time abstain most from taxed salt and furnish most cases of the malady. Elsewhere no one has thought of this as a cause. It is true that leprosy attaches most to people lowest in the scale of intelligence, of wealth and the comforts of life. Such people live most crowded in their habitations, particularly in their beds, and eat with their fingers from a common dish. They have too little clothing to allow frequent changes and clean attire, soap is little used, and personal cleanliness neglected. All these conditions favor contagion, and it is found that contrary conditions are attended with proportional exemption from the disease. The improved condition of Norwegian immigrants in this country, rather than any difference in the climate, has resulted in the moderation and gradual disappearance of leprosy.

Until ten or fifteen years ago most writers of the present age regarded heredity as the chief factor in the production of this disease, and many still adhere to the belief. It is, however, rapidly losing ground, and there are some who are disposed to estimate it of little or no force. Inasmuch as at least a majority of the children of lepers fail to take the disorder, all must admit that the influence is weak. What becomes of heredity among the children of Norwegian immigrants in the States of Wisconsin, Iowa and Minnesota? Two hundred lepers in the first generation, afford only one in the second generation during 50 years. Dr. White states that in 1848, eleven inmates of the Tracadie Asylum had altogether sixty-three children, none of whom were diseased. On the other hand the rapid spread of leprosy in the Sandwich Islands between 1860 and 1875 makes it impossible that any considerable proportion could have inherited the taint. Aside from the mortality due to this malady, the native population there is rapidly diminishing and it is found that lepers have few children, most of whom are

either born dead or die young. According to Dr. G. L. Fitch, who lived several years at the Islands and who must have had abundant means of observation, of twenty-six children born at the Molokai settlement, of parents one or both leprous, and aged from twenty-one months to fourteen years, only two were lepers in 1884, but Dr. Mouritz, two years later, found nine lepers among them. Contagion was doing its work. The group of sixteen cases at Charleston could not be accounted for by heredity, for the Jews belonged to three different families, and there were besides Irish, native whites and blacks; neither did heredity succeed in perpetuating the disorder. In only a very small number of the forty-two cases now at New Orleans does Dr. Blanc succeed in finding lepers among their relatives, either as antecedents or descendants. Of course it is out of the question that heredity could have played any part among the white lepers of the Sandwich Islands, of whom sixteen had been sent to the leper settlement previous to 1880. The advocates of heredity agree that it is much stronger in the maternal than the paternal line, but offer no explanation. It is evident that children are in far closer social relation with the mother than with the father, especially during the first eighteen months of life, so that the chance of contagion would operate in the same degree. Instances are given of skipping over one generation in hereditary transmission. It often happens that children are special favorites of grand parents, and are in closer relation with them than their parents. It would be interesting to note whether atavism in leprosy could actually be explained in this way. In my judgment it is quite easy to account for the cases that occur in the same family otherwise than by inheritance, for there are more opportunities for contagion in the household than elsewhere. Therefore, without totally rejecting the influence of heredity I should say that, in our present knowledge, it is not necessary to invoke it. The real test would be to remove immediately after birth a number of children from leprous parents, and strictly guard them against contagion. Then if any of them should become lepers there would be satisfactory evidence of inheritance. Such a test has not yet been afforded, but it may soon be supplied in the Kapiolani Home, devoted to the care of girls, the children of lepers, not yet confirmed as lepers themselves, and others suspected of the disease, which was opened in the Hawaiian Islands, in November, 1885.

The notion that leprosy is an offshoot or form or stage of syphilis, probably originated in India, where it is entertained by many native and a few European physicians.

So far as I have learned, only two medical men, who have lived on the Sandwich Islands, hold this opinion. namely, Drs. George L. Fitch and F. H. Enders, and the latter is by no means positive. Dr. Fitch's theory of leprosy is thus enunciated (*Pacific Medical and Surgical Journal*, October, 1885): "I believe myself to be fully justified in saying that leprosy is a disease which cannot be communicated from a leper to any other person by, through or under any combination of circumstances except heredity; and that even this plays but little part in the propagation of the disease we may know from the fact that from 1866, when Kalawao settlement was first founded, until March 1, 1884, 2,941 lepers were consigned there, and up to October 9, 1884, only twenty-six children born in the settlement were alive where either parent was a leper before the birth of the child. \* \* \* Suffice to say, that I fully believe leprosy to be a fourth stage of syphilis, or form of scrofula subsequent to syphilis, occurring but rarely except in a virgin race, or contracted from a member of such race; and then only in a person of a broken down or cachectic, nervous constitution, and rarely met with among Anglo-Saxon or Celtic races, except in blonds." *Per contra*, Drs. Arning and Emerson aver that persons contract leprosy whose parents were free of it, and who have never had syphilis. It would be violence to all probability to suppose that the leprosy of Fathers Damien and Gregory, of the Hawaiian Islands, and of Father Bogliori, of New Orleans, who became diseased while in discharge of their sacred functions, was due to syphilis, either inherited or acquired.

This theory of the identity or relationship of the two maladies must have arisen, both in India and the Islands, from their joint prevalence in those countries, and their associations in many individuals. Dr. Fitch lays great stress upon his failure to syphilize several lepers by inoculation with syphilitic virus. This is explained by their being already syphilitic, as the majority of the natives of the Islands are said to be.

Let us now note the history of the two diseases. Leprosy has prevailed in the Old World from time immemorial. Constitutional syphilis is not known to have existed in the Eastern Hemisphere before the discovery of the New World by Columbus;

but it is certain that within a few years after it seized on all classes of people in Italy and Spain, and rapidly spread over Europe. It was a terrible stranger, and its ravages, both in extent and severity, were like those of small-pox among the American aborigines, and leprosy among the Hawaiians. There is abundant mention of venereal sores and gonorrhœa in ancient literature, but nothing like constitutional syphilis was described till within ten years of the close of the fifteenth century, or after the first visit of Columbus to America.

On the other hand, there is no proof that leprosy existed among the aborigines of America before 1492. Again it is said that syphilis has long been prevalent in Kamtchatka, but leprosy is not.

Dr. M. Hagan, of Los Angeles, who formerly resided in the Sandwich Islands, says: "It has been settled beyond dispute that a leper will contract syphilis and recover from it with proper treatment, while the original disease goes on and ends in death." At least ninety-five per cent of syphilitic cases can be thoroughly cured by proper treatment sufficiently prolonged, but the remedies which control it are powerless in leprosy. On the other hand, the remedies which stay the progress of leprosy have gained no success in syphilis. The heredity of uncured syphilis is undisputed, and generally apparent at birth; that of leprosy, if real, never appears till there has been opportunity for contagion, and a sufficient period of incubation.

In 1867 the Royal College of Physicians, of London, published their famous opinion in opposition to the contagiousness of leprosy, "on hearsay evidence;" which opinion has governed the action of the British Government ever since, and has exerted a world-wide influence.

In the discussion before the French Academy of Medicine in 1885, only three French physicians held the doctrine of contagion, but in 1888 the number was much larger. (Dr. P. A. Morrow, *New York Medical Journal*, July 29, 1889.) It is encouraging to note that the Committee on Leprosy of the Royal College of Physicians has recently recommended another investigation of the subject. In China and India leprosy prevails as of old, where repression has never been tried effectually. In Europe the plan of segregation during the thirteenth, fourteenth and fifteenth centuries nearly eradicated the malady. For want of such repression leprosy is now increasing in most



of the British Colonies. New Brunswick is a notable exception. Dr. Hansen remarks: "I have met with families of which only those members became leprous that had emigrated to places where leprosy prevailed. The members that remained at home did not catch the disease." With due regard to cleanliness and avoidance of all secretions and exudations from lepers he thinks there is no danger.

Proofs of communication through contagion are innumerable. There is no other way to account for the rapid spread of leprosy in the Hawaiian Islands, and especially its contraction by white residents. For example, Dr. A. W. Saxe, in a paper read to the California State Medical Society in 1881, gave an instance of three children of American parents, who remained healthy, having become lepers in Honolulu. Their mother did not nurse them, and they evidently were somewhat inoculated by a native wet nurse or some leprous playmate. The supposition that the disease existed among the indigenous Mexicans is probably a mistake, for the aboriginal race are free of it, except where they have lived in close relation with the whites or negroes, as in those regions settled by the Spaniards and Portuguese. It is much more likely that American leprosy was derived from Europe and Africa. No heredity, nor syphilis, nor endemic conditions could have given rise to the group of sixty cases in the village of Spain, to the outbreaks in New Brunswick and Cape Breton Islands, to the sixteen cases at Charleston between 1846 and 1876, to the forty-two now at New Orleans, or to the two at Galveston. It is often impossible to trace the source and mode of contagion, but the same is true with all the disorders whose contagiousness is undisputed.

Besides, we have the evidence of inoculation, which is incontrovertible. Dr. Fitch gives some instances of failure, and adduces the convict Keanu, who was inoculated at the Sandwich Islands by Dr. Arning in 1884, as an alternative to the death penalty; but the man died of leprosy since Dr. Fitch wrote, and some of his other instances may result in like manner.\*

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\*As to Keanu, Dr. Arning supposed that there had been no leprosy previously in his family, but Dr. S. B. Swift, resident physician at the Molokai settlement, avers that this man's son and sister's son were both lepers before his inoculation. (*Occidental Medical Times*.) Consequently, it is possible that Keanu may have contracted leprosy in the natural way, though the bacilli were found at the point of inoculation for more than a year afterwards.

Dr. J. C. Tache, of Canada, relates the following: "At the funeral of one of the first lepers at Tracadie, a young man who helped carry the coffin on his shoulder received an abrasion of the skin from its sharp edge. There was a flow of liquid from the coffin which wet the abraded spot, and he had no opportunity for several hours to change his clothing or cleanse himself. He had no hereditary taint, but died a leper within a few years.

Dr. A. C. Smith, of Newcastle, N. B., relates the case of a boy, now far advanced in leprosy, who at three years of age was waited on by a leprous woman while he was in the healing stage of a burn. There had been no leprosy in his family. Dr. Hansen, surgeon to the leper hospital at Bergen, has published some cases where inoculation has taken place. Dr. Saxe gives the case of a physician's son who acquired the disease after inserting a pin into his leg which a little Hawaiian leper had just previously thrust into an anæsthetic patch on his own leg. (Prof. White, *American Journal of Medical Science*, October, 1882.) Dr. Hillebrand relates this occurrence in Borneo: A colored leprous boy ran a knife into an anæsthetic part of his body, his white playmate then ran the same knife into his own flesh. The white boy went to Europe, and nineteen years after developed leprosy. It has been suggested that leprosy might be inoculated by the bites of flies and mosquitoes coming from leprous sores, and it is supposed by Dr. Manson that elephantiasis arabum is communicated in this way. The supposition is certainly more probable with the former than the latter, and might account for some mysterious cases.

It is important to make a distinction between contagion and infection. Unfortunately there is a want of precision in their definitions, and great confusion in the use of the terms. Here I would suggest that we understand contagion to mean the reception of a disease poison through some solution of continuity, and infection its absorption through an unbroken surface. Contagion would therefore mostly operate by immediate application of virulent matter to an external abraded spot; and infection commonly be produced on respiratory surfaces through the medium of the atmosphere. The same distinction would apply to microbes in the alimentary canal and on the genito-urinary parts. It follows, therefore, that infectious diseases only are liable to become epidemic. In this sense leprosy would be contagious but not infectious, since it is probably

necessary for the virus to come in contact with an exposed capillary surface, in order to be absorbed. This is indicated by the safety of persons casually meeting lepers, and it explains the fact that individuals have lived in intimate relations with lepers for years without harm. Proof of the absolute non-contagiousness of leprosy is claimed from the well-known and numerous instances of escape during many years of married life between lepers and non-lepers. Safety is attributable to a sound skin or failure to apply the virus to an absorbing surface. The contagiousness of syphilis is never questioned, but it is probably not communicated through a sound mucous surface, for many incontinent men have always escaped it. The explanation that sexual relations with lepers is less dangerous than with syphilitics, is the fact that leprosy is not apt to attack the generative organs.

The period of incubation is probably rather indefinite. Most writers say from five to ten years, but it is often less. In the case of a man inoculated by Dr. Arning there were manifest symptoms of leprosy within three years, and the young man mentioned by Dr. Tache began to complain within a year but lived about eleven years. It is not improbable that there was a mistake in the period of incubation given for the first communication of the malady at the little village in Spain, previously mentioned as only a few months; it might have been longer. Dr. Hansen mentions the case of a Hollander who became a leper ten years after his return from the West Indies. I have already mentioned a case in this paper in which the latent period was supposed to be forty years, but this seems incredible. 3

As to sex, the common opinion is, that males are considerably in excess of females. This is probably correct, though females in the seclusion of home would be more apt to escape observation. But it is plain that men and boys, being more away from home, in all sorts of company, would be more exposed to contagion. With heredity as the prevailing cause there should be no such marked sexual selection.

It is agreed that the majority of cases begin between the ages of fifteen and forty years, which is the period of greatest activity and exposure. Under three years of age it is extremely rare. Dr. Fitch has not known a case before the commencement of second dentition, but Arning in the Sandwich Islands, and

Kynsey in Ceylon, have seen it at three years. Dr. Torrens has observed it in infancy in the Canary Islands, but the precise age is not given. We may safely conclude that there is always time for a reasonable incubation after exposure.

The natural duration of leprosy varies with the type and circumstances influencing progress. Lewis and Cunningham give the average duration of the tubercular form in India as six years shorter than that of the anæsthetic, and fourteen years for cases in general. Dr. Graham (Wood's Hand Book) states that leprosy usually proves fatal in seven or eight years. Danielson and Boeck, of Norway, give the average duration as eight or nine years for the tubercular type, and eighteen or nineteen for the anæsthetic, but sometimes prolonged to forty years. Dr. Arning in 1888 gave the duration from five to ten years, but Dr. Hillebrand whose experience in the islands dated fifteen years earlier, put it at three to five years. It is always understood that cases of mixed type have a progress slower than the tubercular and faster than the anæsthetic.

The circumstances modifying leprosy are numerous and varying in effect. Any causes which lower the standard of health, like previous sickness, deficiency or bad quality of food, exposure to bad weather, excessive exertion, sexual excesses; intemperance, living in close and crowded apartments, deficiency of clothing for change, neglect of ablutions, all favor both the contraction and rapid progress of the disorder. Improvement in all these respects accounts for the development of new cases among Norwegian immigrants, and, with a single exception, of the exemption of their progeny in the United States.

Admitting the contagiousness of leprosy, it is probable that it varies greatly in degree among different individuals and races, as is true of other diseases. Dr. Mouritz concludes that about eighteen per cent of the islanders resist contagion totally, judging from his experience at the Molokai settlement. It is doubtful whether one per cent would resist intentional inoculation. Where the disease has prevailed for thousands of years, as in Egypt, India and China, and where the anæsthetic is the prevailing type, the principle of natural selection and survival of the fittest would gradually increase the resistance<sup>2</sup> of the people and in time those races might become exempt. In the absence of effective repressive measures, the population must otherwise have greatly diminished. The same reasoning for ages of the

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natives of those countries likewise explains the protracted course of the disorder. Without such acquired resistance, and in the absence of repressive measures, its ravages would equal what was experienced in Europe in the twelfth, thirteenth and fourteenth centuries.

Without apprehending a high degree of contagiousness for leprosy, or great risk in ordinary intercourse, it is clear that serious danger often lurks in unexpected quarters. Two priests and one physician, Dr. Edward Hoffman, undoubtedly contracted it on the islands, while pursuing their ordinary avocations; also a priest at New Orleans. What might have happened—indeed may already have been incurred here in California—from the Marysville barber who continued to shave men's faces for years after he became a leper; from the San Francisco teamster who escaped and pursued his regular business more than two years; from a far advanced case lately found in a Chinese laundry at Sacramento; from an escaped leper supposed now to be engaged in fishing in the river, from two Chinese cooks and a Mexican dishwasher sent to the San Francisco Pest-house within the past year! Probably not one of these individuals could point out the particular source of his own taint; more than possible other mysterious cases may follow them, like lengthened shadows to a hopeless doom. In fact, an instance has actually occurred in California of a white boy, now a leper, whose father has employed Chinese both on his ranch and in his house, some of whom are said to have had a cutaneous disorder.

#### BACILLUS LEPRÆ.

The credit of first discovery of the *Bacillus Lepræ* is given to Hanson, of Bergen, of date varying from 1869 to '74, according to different writers.

In 1879 Neisser announced an independent discovery. The latter has inoculated rabbits and dogs with leprous matter and so produced inflammatory nodes corresponding to human leprosy. He supposes that the spores enter the system and develop wherever they find a suitable nidus, especially in the lymphatic glands. Thence they invade the entire body. Eichhorst states that artificial inoculation of animals has failed, and this has been Arning's experience in the Hawaiian Islands. Neisser, Damsch and Vossins have succeeded in the culture of the bacilli at the infected spots. The bacilli are found in the skin, mucous membranes, peripheral nerves, lymph-glands, testes, liver,



spleen and eyes, also in the blood, usually enclosed in white blood corpuscles. From the *Annual of Universal Med. Sci. for 1888* (Sajous) I condense the following. The bacilli lepræ have never yet been found in the blood. When introduced into the circulation these organisms probably are rapidly carried to the capillaries and thence by diapedesis to lymph spaces, where they set up the characteristic changes. Lymph may contain bacilli. Glandular secretions and excretions, notably the urine, are almost entirely free. Tears, the nasal secretion and the saliva swarm with them whenever the ocular, nasal or buccopharyngeal surfaces are lepromotous; also the alvine discharges in leprous diarrhea. When the testes are involved, the semen contains bacilli. The uterine mucus and vaginal secretions never do. Vaccinal lymph from lepers contain them. Leprosy may almost certainly be conveyed from venereal sores. The lymphatic and ganglia are characteristic and constant foci of the bacilli. The central nervous system is not affected by leprosy, as it is by syphilis. There are two methods of conveying disease through bacteria: 1. By direct contact or inoculation. 2. Indirectly through soil, air, water or food. Arning has succeeded with the former mode, but failed with the latter in his experiments with leprosy. (This indicates that leprosy is contagious but not infectious.)

Dr. Edw. E. Arning, by invitation of the Hawaiian Government, pursued the study of leprosy in the islands from 1883 to '85. The following is a brief abstract of his observations in its bacteriology. He found B. in the trunks of nerves supplying anæsthetic patches, but not in the patches themselves, nor in chronic sores resulting therefrom. No B. in blood or urine. They were found in the nodules of the tubercular form. Culture experiments failed to reproduce B. Inoculation failed to prove the disease in the lower animals. (It had failed in the convict Keanu up to the date of his departure. The animals should have been kept under observation at least three years.) He considers leprosy peculiar to mankind, and transmission from one person to another directly through the bacilli, or through the intermediate stage of spores. Arning found B. lep. in leprous corpses, even after the appearance of bacteria of putrefaction; but could not aver that they were alive. B. are not found in the red maculæ of the face, which usher in many cases. Excision from the point of inoculation of Keanu

showed B. under microscope for fourteen months, but in diminishing numbers. After vaccination of lepers he found B. lepræ in the lymph and crusts.

Dr. Prince A. Morrow (*N. Y. Med. Jour.*, July, '89) states that he had failed to find B. lep. in any part of a still-born child at full term. (Repeated observations would throw light on the heredity of leprosy, and no opportunity should be lost.)

Dr. J. H. Stallard, of San Francisco, has kindly given me a report of his studies in the bacteriology of leprosy, and slides prepared by himself for microscopic observations. He finds that the bacilli persist in water and other fluids; notwithstanding the presence of putrefactive bacteria, for at least eighteen months. As they are motionless and inoculation is inadmissible we have no positive evidence of activity; but the slides show that the bacilli continue in every possible form: as spores, more or less aggregated; as bacilli of various lengths and diameter, plain or beaded, single or in closely woven zoogloæ. His experiments indicated water to be the vehicle of contagion. After immersion of leprosy tissue in absolute alcohol for over a year, he found that subsequent treatment with water would not remove the bacilli, though they could still be seen in situ.

Dr. J. E. Graham (*Wood's Ref. Hand Book*) remarks: "It is probable that the spores or bacilli themselves find their way into the body through some lesion in the epithelium, and thus by their growth the system is affected. Nodules and infiltrations are thus the result of specific irritation due to presence of bacilli."

The mechanical action of these microbes seems to me a correct supposition. Their growth and pressure on blood vessels and nerves satisfactorily explains the mutilations and anæsthesia, and pressure on solid tissues accounts for the ulcerations characteristic of the disorder.

The morphological resemblance of the bacilli of leprosy to those of tuberculosis has been observed by bacteriologists, likewise the slow growth of both microbes. The analogies in the natural history of the two disorders are equally striking; their slow progress, their frequent arrest and occasional retrogression; the usual relapse and final determination, unless anticipated by a fatal intercurrent attack of another disease; the prolonged period of incubation; and probably in both cases a necessary solution of continuity for admission of the microbes to the

internal organism. Moreover, it may be found, in time, that heredity figures about as much in one as in the other.

The uniform presence of the bacilli in lepers, whenever looked for, and their absence from non-leprous subjects, demonstrate their connection with the disease. Successful inoculation demonstrates their causative agency and its contagiousness. Even without the evidence of specific bacteria, proofs of the communicability of leprosy are, in my judgment, satisfactory: with it there is no escape. It is improbable that these microbes should find access through sound mucous surfaces of the respiratory or alimentary tract, for then the disease would be infectious, like measles and typhoid fever, and vastly more prevalent. It is apparent, however, that individuals affected with lesions of any tract, whether external or internal, accessible to the air or to food and drink, might offer an avenue to leprous matter, either in the moist or pulverulent state. The morbid intestinal discharges and external ulcerations of lepers are known to abound in the specific bacilli, and are doubtless the general sources of contagion. Who knows the antecedents of old rags, of the cast-off clothing that goes to the shoddy factory, of the second hand clothing which many people handle and wear? The persistency of leprous bacilli has been demonstrated. Such considerations give a creditable explanation of some mysterious cases and a warning of danger lurking at unexpected moments.

#### THE CONTROL OF LEPROSY.

This subject naturally falls under two heads: *a*, curative; *b*, preventive.

*a*. It is not my intention to make even the most superficial review of the various remedies and modes of treatment in this malady, but only to notice a few agents lately approved. Dr. Arning found that the use of ointments having ten per cent strength of salicylic and pyrogallic acids destroyed the tubercles, softened the infiltrations and sometimes restored sensibility to anæsthetic patches. Salicylic acid was tried also internally with apparent benefit. Hypodermic injections of corrosive sublimate, 160 in the course of two years, were followed by amendment in one case; in another, eighty injections were followed by retarded rate of progress. He found electricity beneficial to the anæsthesia. Potassium iodide failed of good results. With apparent improvement from certain agents, as

above, he does not claim lasting cures. Dr. C. J. Peters of Bombay has used the following course. 1: Carbolic oil (1 in 40) is rubbed over the whole body to promote healthy action of the skin. This is followed by soap and water ablution. 2: To the ulcerated spots an emulsion of gurgin oil and lime water (1 in 3) is applied by friction or on cotton with a bandage. 3: To the anæsthetic patches and tubercular growths cashewnut oil is applied with a brush or feather. 4: Internally five minim doses of Chaulmoogra with five grains of sodium bicarbonate in one ounce of peppermint water are given. In some cases three grain doses of potassium iodide. The results obtained were healing of ulcers, dispersion of tubercles, restoration of sensibility and relaxation of contractions.

The general testimony, however, is to the effect that any mode of treatment is in the end disappointing. Arrest of progress is only temporary, being usually followed by suspension of treatment. Indeed it is not certain that long perseverance would be attended by permanent relief. At the Tracadie Hospital patients have been discharged apparently cured, but they generally returned to die. The results are even less encouraging than in the treatment of pulmonary consumption. Doubtless some have improved enough to be discharged, have gone out and died of other diseases, and have been considered cured of their leprosy; but there is no proof, and it is rather probable that in time it would have returned. The health authorities of the Hawaiian Islands consider leprosy practically incurable, though they acknowledge that life may be prolonged by certain medical treatment, by good food and favorable sanitary conditions.

b. Since, then, so little is to be expected of curative treatment there is no question of the necessity of vigorous preventive measures. In the earliest stages recognition of the disease is difficult and generally impracticable, but then the danger is small. As soon as diagnosis can be reached without risk of making a mistake, there should be no hesitation or failure about enforcing segregation. Long ago the people of California recognized the danger of planting leprosy on this coast through Chinese immigration, and for more than fifteen years legislation has given abundant authority for its exclusion and repression.

Inasmuch as the control of leprosy within the national borders belongs to the separate States, it is highly desirable that they

should enact substantially uniform laws. The subject is a suitable one for the consideration and action of the Conference of State Boards of Health, and this body could frame a bill suitable as a model for all the states. It would then be the duty of each State Board of Health to procure the passage of an act for that purpose.

This part of the subject would be incomplete without noting some necessary precautions in disposing of leprous corpses. Bacteriologists have shown that the bacilli of leprosy, unlike many others, withstand the bacteria of putrefaction. We know that the soil is poisoned for many years by the bacilli of anthrax, for the rapid contagiousness of the disease has proved it. The contagion of leprosy is so slow that proof may never be made satisfactory how long the virus persists; but danger is to be apprehended and it is easy to obviate it. The law should direct some effective method or methods of disinfection. Cremation would certainly be effectual, but could not be made compulsory in the nineteenth century. Whoever lives to the second half of the twentieth century will probably witness the cremation of bodies dead of dangerous disease. For the present we might be content with burial in quicklime, and might, perhaps, obtain legal authority to enforce it.

The full extent of this fearful malady no one knows. Few writers name even half the countries where it may be found. Though the civilized world has substantially won the victory, the enemy returns casually and carries off one or more victims from the best regulated communities. In all the four quarters of the globe it retains a foot-hold. In its ancient seats of Asia and Africa it holds undisputed sway, almost without exception stationary, or perhaps slowly declining, because the races are growing resistant by survival of the fittest. In Europe it has a strong-hold in Norway, from which it may be dislodged and, perhaps, quite expelled within half a century. It holds ill-defined territory in Southern and Central America, the West Indies and Mexico, and a small tract in British America. In Australia it is occupying new territory.\* In the Sandwich Islands there is a struggle for life between the newly civilized people and the destroyer. In our own country the portions

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\*The President of the Board of Health for New South Wales, "reports at present twelve cases in Sydney; ten Chinamen, one Japanese and one Englishman. Thus it is clearly, as in so many other places, almost exclusively a disease of Chinamen."—*British Medical Journal*, February, 1890.



once dominated by the Spaniards, have had the earliest and latest experience, even to the present hour. South Carolina has not escaped, Wisconsin, Iowa and Minnesota have received it with Norwegian settlers, Utah with Mormon converts, and the Pacific States with Chinese. New York City is seldom without specimens brought in ships from queer ports in foreign lands, and the other commercial cities are frequently startled with strange visitors. Occasionally, as at Charleston in the past and New Orleans in the present, alarming numbers come to light.

Just now the point most threatened is New Orleans, for no legal barrier stands to protect the great city, which, after a long and dreadful struggle, has lately gained the mastery of tropical yellow fever by quarantine. The successful method of Ulloa and Miro is forgotten or unheeded by the authorities, and must be rediscovered to save the people from the fate of the Hawaiians. Here in California the enemy, few and scattered, are in our midst, and others are liable to come on every ship from China and the Islands; but we have been fully warned, and are armed with lawful weapons. It is our own fault if they do not protect us.

One other provision is needed—a State hospital for lepers. Our statute enables local authorities to act for themselves, but not one of the counties has a suitable lazaretto. San Francisco has always had more than half the lepers in the State, but its only accommodation is the pest house, where lepers and small-pox cases are lodged in the same house. That the lepers escape small-pox and the small-pox patients escape leprosy is rather good luck than good management. At least one leper has died of small-pox, and some lepers of the future may be reminded of a former residence at the same institution for the other complaint. Apart from such improper association of subjects of the two diseases, the pest-house is an insecure place. Only lately a leper, in a far advanced stage, has been recommitted, who escaped two and one-half years ago, and was at large in the city during the whole interval. A small island near San Francisco would be the proper site for a lazaretto, and accommodations for twenty-five lepers would be large enough for present and prospective needs, inasmuch as most have hitherto been sent back to China.

It has also been suggested that a contract be made if possible with the Hawaiian Government to have all lepers cared for at

the leper settlement on Molokai. In Louisiana there is imperative need of such an institution, and of legislation equivalent to the act of California. As to the other States it would be sufficient to pass the necessary isolation act and leave its execution to the State Board of Health, with power to draw warrants upon the treasury, not to exceed a fixed amount, for the expenses. I would not be understood as encouraging any alarm on this subject, even in Louisiana or California. Our State needs only faithful enforcement of existing laws with a suitable lazaret; while Louisiana would be saved by a revival of the forgotten plan of Moro, which was successfully in operation just a century ago.

In conclusion, I would not be unmindful of courtesies and assistance rendered in the collection of data for this paper from a large number of correspondents at home and abroad. They are too numerous for individual mention, further than is already indicated. Among them officers of Health Boards have rendered especial service. To all I tender sincere thanks.

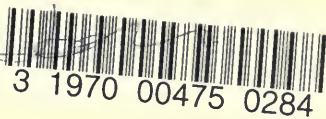


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